WHAT IS CLAIMED IS:

1. A method for determining distance between a first node and a second node in a network, comprising:

generating a timestamp message at the first node, the timestamp message including a first value;

transmitting the timestamp message to the second node;

recording a second time value representing a time at which a portion of the timestamp message is being transmitted;

receiving the timestamp message at the second node;

generating a new timestamp message at the second node in response to receiving the timestamp message;

storing the first value from the timestamp message in the new timestamp message;

storing second node processing time information in the new timestamp message;

transmitting the new timestamp message to the first node;

receiving the new timestamp message;

recording a third time value representing a time at which a portion of the new timestamp message is received; and

determining the distance between the first node and the second node using the first value, the second time value, the third time value, and the second node processing time information.

2. The method of claim 1 wherein the transmitting the timestamp message to the second node and the transmitting the new timestamp message to the first node include:

transmitting the timestamp message and the new timestamp message over a free-space link.

3. The method of claim 2 wherein the free-space link includes a radio link.

4. The method of claim 2 wherein the free-space link includes an optical link.

5. The method of claim 1 wherein the transmitting the timestamp message to the second node and the transmitting the new timestamp message to the first node include:

transmitting the timestamp message and the new timestamp message over a fiber optic link.

6. A method for determining distance between a first node and a second node in a network, the method, performed by the first node, comprising:

generating a timestamp message, the timestamp message comprising a first value;

transmitting the timestamp message to the second node;

recording a second time value representing a time at which the timestamp message is being transmitted;

receiving a new timestamp message from the second node, the new timestamp message comprising the first value and a third time value representing the time during which the second node processed the timestamp message;

recording a fourth time value representing a time at which the new timestamp message is received; and

determining the distance between the first node and the second node using the second time value, the third time value, and the fourth time value.

7. The method of claim 6 wherein the first node communicates with the second node over a free-space link.

8. The method of claim 7 wherein the free-space link includes a radio link.

9. The method of claim 7 wherein the free-space link includes an optical link.

10. The method of claim 6 wherein the first node communicates with the second node over a fiber optic link.

11. The method of claim 6 further comprising:

obtaining the first value and the second time value by reading a local clock.

12. The method of claim 6 wherein the determining includes:

determining a round-trip time by subtracting the second time value and the third time value from the fourth time value, and

determining the distance between the first node and the second node by dividing the round-trip time by two.

13. The method of claim 6 further comprising:

transmitting, prior to transmitting the timestamp message, a first message to the second node, the first message instructing the second node to stop enqueing messages for transmission and transmit messages already enqueued,

wherein the transmitting the timestamp message occurs a predetermined time period after transmitting the first message.

14. The method of claim 13 wherein the predetermined time period is a maximum period needed for the second node to transmit enqueued messages.

15. The method of claim 13 wherein the predetermined time period is an amount of time in which the second node is statistically likely to transmit enqueued messages.

16. In a first node, a system for determining distance between the first node and a second node, comprising:

means for generating a message, the message comprising a first value;

means for transmitting the message to the second node;

means for storing a second time value representing a time at which the message is being transmitted;

means for receiving a message from the second node, the received message comprising the first value and a third time value representing a time period during which the second node processed the message;

means for recording a fourth time value representing a time at which the received message is received; and

means for determining the distance between the first node and the second node using the first value, the second time value, the third time value, and the fourth time value.

17. A communications node comprising:

a transmitter configured to transmit a message to another communications node, the message comprising a first value;

a receiver configured to receive a message from the other communications node, the received message comprising the first value and a second time value representing a time period that the other communication node processed the message; and

logic configured to:

record a third time value representing a time at which the message is transmitted by the transmitter,

record a fourth time value representing a time at which the received message is received by the receiver, and

determine distance between the communications node and the other communications node based on the second time value, the third time value, and the fourth time value.

18. The communications node of claim 17 wherein, when transmitting the message, the transmitter is configured to:

transmit the message via a packetized communications link.

19. The communications node of claim 17 wherein, when transmitting the message, the transmitter is configured to:

transmit the message via a free-space link.

20. The communications node of claim 19 wherein the free-space link includes a radio link.

21. The communications node of claim 19 wherein the free-space link includes an optical link.

22. The communications node of claim 17 wherein, when transmitting the message,

the transmitter is configured to:

transmit the message via a Carrier Sense Multiple Access (CSMA) based communications link.

23. The communications node of claim 17 wherein the first time value is stored in a header of the message.

24. The communications node of claim 17 wherein the first time value is piggybacked into a message that is scheduled to be transmitted to the other communications node.

25. The communications node of claim 17 wherein, when determining the distance between the communications node and the other communications node, the logic is configured to:

determine a round-trip time by subtracting the second time value and the third time value from the fourth time value, and

determine the distance between the communications node and the other communications node by dividing the round-trip time by two.

26. A communications node comprising:

a receiver configured to receive a message from another communications node, the message comprising a first value;

logic configured to:

generate a new message,

store the first value in the new message, and

store a second time value in the new message, the second time value representing a time period during which the communications node processes a message; and

a transmitter configured to transmit the new message to the other communications node.

27. The communications node of claim 26 wherein the time period is an estimate based on a third time value that represents a time at which a last bit of a previous message was received by the receiver and a fourth time value representing a time at which a last bit of a previous new message was transmitted by the transmitter.

28. The communications node of claim 27 wherein the logic is further configured to:

update the time period estimate.

29. The communications node of claim 28 wherein, when updating the time period estimate, the logic is configured to:

record a fifth time value that represents a time at which a last bit of the message is received by the receiver and a sixth time value representing a time at which a last bit of the new message is transmitted by the transmitter,

determine a turnaround time by subtracting the fifth time value from the sixth time value, and

update the time period estimate based on the turnaround time.

30. The communications node of claim 26 wherein the logic is further configured to:

store information regarding a variance of the second time value in the new message.

31. A method, performed by a communications node, for processing a message, the method comprising:

receiving a message from another communications node, the message including a first value;

creating a new message in response to the receiving;

storing the first value in the new message;

storing a second time value in the new message, the second time value representing a time period estimate based on a third time value representing a time at which at least one previous message was received and a fourth time value representing a time at which at least one previous new message was transmitted; and

transmitting the new message to the other communications node.

32. The method of claim 31 further comprising:

updating the time period estimate.

33. The method of claim 32 wherein the updating the time period estimate includes:

recording a fifth time value that represents a time at which a last bit of the message is received and a sixth time value representing a time at which a last bit of the new message is transmitted,

determining a turnaround time by subtracting the fifth time value from the sixth time value, and

updating the time period estimate based on the turnaround time.

34. The method of claim 31 further comprising:

storing information regarding a variance of the second time value in the new message.

35. A method for determining distance between a first node and a second node, the method comprising:

transmitting a Request to Send (RTS) frame from the first node to the second node;

receiving the RTS frame at the second node;

transmitting a Clear to Send (CTS) frame from the second node to the first node in response to receiving the RTS frame;

transmitting a message to the second node in response to receiving the CTS frame, the message including a first value;

storing, in a memory, a second time value representing a time at which a portion of the message is being transmitted;

receiving the message at the second node;

generating a new message at the second node in response to receiving the message;

storing the first value from the message in the new message;

storing second node processing time information in the new message;

transmitting the new message to the first node;

receiving the new message at the first node;

recording a third time value representing a time at which a portion of the new message is received by the first node; and

determining the distance between the first node and the second node using the second time value, the third time value, and the second node processing time information.

36. The method of claim 35 wherein the determining includes:

using the first value to retrieve the second time value from the memory.

37. A method for determining distance between a first node and a second node, the method comprising:

transmitting a Request to Send (RTS) frame from the first node to the second node, the RTS frame including a timestamp message that includes a first value;

storing, in a memory, a second time value representing a time at which the RTS frame is being transmitted;

receiving the RTS frame at the second node;

storing the first value from the RTS frame in a Clear to Send (CTS) frame;

storing second node processing time information in the CTS frame;

transmitting the CTS frame to the first node;

receiving the CTS frame at the first node;

recording a third time value representing a time at which the CTS frame is received by the first node; and

determining the distance between the first node and the second node using the second time value, the third time value, and the second node processing time information.

38. A method for determining distance between a first node and a second node, the method comprising:

transmitting a Request to Send (RTS) frame from the first node to the second node, the RTS frame including a first timestamp message that includes a first value;

storing, in a memory, a second time value representing a time at which the RTS frame is being transmitted;

receiving the RTS frame at the second node;

storing the first value from the RTS frame in a Clear to Send (CTS) frame;

storing second node processing time information in the CTS frame;

storing a second timestamp message that includes a third value in the CTS frame;

transmitting the CTS frame to the first node;

recording a fourth time value representing a time at which the CTS frame is being transmitted;

receiving the CTS frame at the first node;

recording a fifth time value representing a time at which the CTS frame is received by the first node;

determining the distance between the first node and the second node using the second time value, the fifth time value, and the second node processing time information;

storing the third value from the CTS frame in a data frame;

storing first node processing time information in the data frame;

transmitting the data frame to the second node;

receiving the data frame at the second node;

recording a sixth time value representing a time at which the data frame is received by the second node; and

determining the distance between the second node and the first node using the fourth time value, the sixth time value, and the first node processing time information.

39. A method for determining distance between a first node and a second node, the

method comprising:

transmitting a Request to Send (RTS) frame from the first node to the second node;

receiving the RTS frame at the second node;

storing a first timestamp message in a Clear to Send (CTS) frame, the first timestamp message including a first value;

transmitting the CTS frame to the first node;

storing, in a memory, a second time value representing a time at which the CTS frame is being transmitted;

receiving the CTS frame at the first node;

storing the first value from the CTS frame in a data frame;

storing first node processing time information in the data frame;

storing a second timestamp message that includes a third value in the data frame;

transmitting the data frame to the second node;

recording a fourth time value representing a time at which the data frame is being transmitted;

receiving the data frame at the second node;

recording a fifth time value representing a time at which the data frame is received by the second node;

determining the distance between the second node and the first node using the second time value, the fifth time value, and the first node processing time information;

storing the third value from the data frame in an acknowledgement frame;

storing second node processing time information in the acknowledgement frame;

transmitting the acknowledgement frame to the first node;

receiving the acknowledgement frame at the first node;

recording a sixth time value representing a time at which the acknowledgement frame is received by the first node; and

determining the distance between the first node and the second node using the fourth time value, the sixth time value, and the second node processing time information.